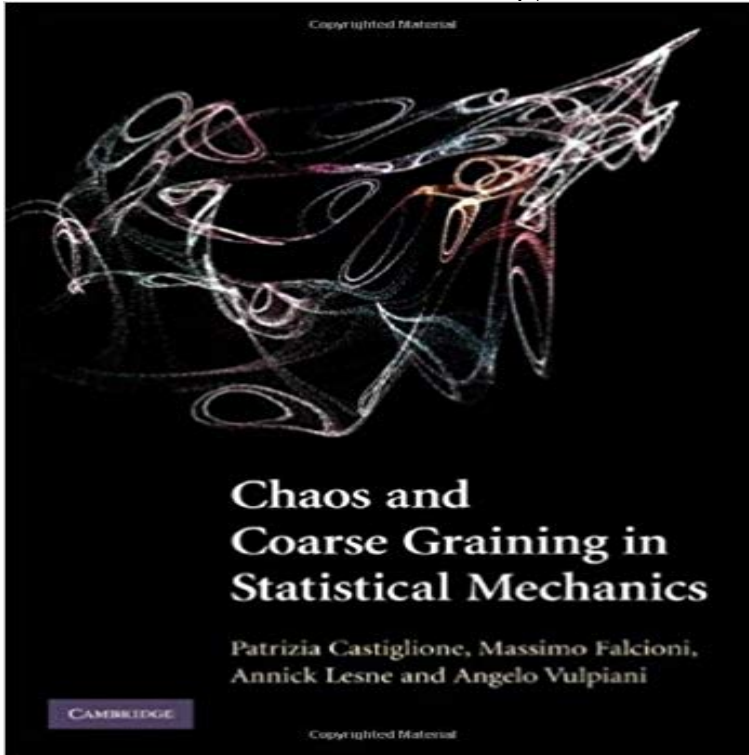


# Chaos and Coarse Graining in Statistical Mechanics



While statistical mechanics describe the equilibrium state of systems with many degrees of freedom, and dynamical systems explain the irregular evolution of systems with few degrees of freedom, new tools are needed to study the evolution of systems with many degrees of freedom. This book presents the basic aspects of chaotic systems, with emphasis on systems composed by huge numbers of particles. Firstly, the basic concepts of chaotic dynamics are introduced, moving on to explore the role of ergodicity and chaos for the validity of statistical laws, and ending with problems characterized by the presence of more than one significant scale. Also discussed is the relevance of many degrees of freedom, coarse graining procedure, and instability mechanisms in justifying a statistical description of macroscopic bodies. Introducing the tools to characterize the non asymptotic behaviors of chaotic systems, this text will interest researchers and graduate students in statistical mechanics and chaos.

CHAOS AND COARSE GRAINING IN. STATISTICAL MECHANICS. While statistical mechanics can describe the equilibrium state of systems with many degrees of freedom, and dynamical systems explain the irregular evolution of systems with few degrees of freedom, new tools are needed to study the evolution of systems with many degrees of freedom. This book presents the basic aspects of chaotic systems, with emphasis on systems composed by huge numbers of particles. Firstly, the basic concepts of chaotic dynamics are introduced, moving on to explore the role of ergodicity and chaos for the validity of statistical laws, and ending with problems characterized by the presence of more than one significant scale. Also discussed is the relevance of many degrees of freedom, coarse graining procedure, and instability mechanisms in justifying a statistical description of macroscopic bodies. Introducing the tools to characterize the non asymptotic behaviors of chaotic systems, this text will interest researchers and graduate students in statistical mechanics and chaos.

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